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(73) Proprietor : MAGNECO/METREL, INC.
206 Factory Road
Addison, Illinois 60101 (US)

(72) Inventor : Soofi, Madjid
1716 Essex Court
St. Charles, Illinois 60174 (US)

(74) Representative : Bayliss, Geoffrey Cyril et al
BOULT, WADE & TENNANT 27 Furnival Street
London EC4A 1PQ (GB)

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Description

This invention relates to an impact pad used in a tundish vessel for the purpose of reducing turbulence caused by pouring molten iron or steel into the tundish vessel according to the preamble of claim 1.

In a tundish vessel of the type used in the iron and steel industry, there are typically variations in the purity of the molten iron or steel contained therein. When the molten iron or steel is in a nonagitated, nonturbulent state, impurities in the molten material tend to float to the top of the molten material, causing formation of a so-called "slag" layer. In other words, the purest of the molten iron or steel exists near the bottom of the vessel.

Molten iron or steel is poured into the tundish vessel from the top, and exits at the bottom. By maintaining a sufficient level of molten iron or steel in the vessel, and a sufficient residence time to allow impurities to float to the top, the concentration of impurities is reduced to a minimum in the lowermost portion of the vessel where the molten material leaves the vessel for further processing. Problems associated with impurities occur, however, when the pouring of molten iron or steel into the tundish from the top creates sufficient agitation and turbulence that some of the slag material is forced downward into the lowermost portion of the tundish vessel, or is prevented from rising.

Varius methods and devices have been invented for the purpose of reducing turbulence in a tundish vessel caused by the pouring of molten iron or steel into the vessel. US-A- 4,177,855 discloses a pair of swinging doors is shown which helpt protect the slag layer from turbulence caused by the pouring of molten metal. A flat impact pad provides an elevated splashing surface which helps contain most of the turbulence between the swinging slabs. US-A-4,042,229 discloses the use of a first pair of sidewalls adjacent a flat impact pad and a second pair of sidewalls separating the slag from the pouring areas, for separating the region of turbulence from the slag layer.

DE-A-26 43 009, upon which the preamble of claim 1 is based, discloses the use of a splash plate which contains, as part of the pad, a plurality of very small sidewalls arranged in a honeycomb configuration.

FR-A-1081253 and FR-A-2132517 disclose mould in which ingots are cast and have forms of splash plates in the bottoms of the moulds.

While the various prior art devices have helped contain the area of turbulence horizontally using variuos sidewalls, none of these devices has the purpose or function of eliminating or substantially reducing vertical splashing. Hence, while some agitation and turbulence have been somewhat contained, they have not, until now, been substantially reduced.

With the foregoing in mind, it is an object of the invention to provide an impact pad for a tundish vessel which substantially reduces the vertical splashing associated with the pouring of molten iron or steel into the tundish vessel, and substantially reduces the agitation and turbulence of molten or steel present in the tundish vessel, when additional molten iron or steel is poured into the vessel.

This invention provides a tundish vessel used in the iron and steel industry having a horizontal floor, a region of impact on the floor and a drain spaced from the region of impact; characterised in that an impact pad formed from a high temperature-resistant refractory composition capable of withstanding continuous exposure to molten steel is, located on the floor of the tundish vessel at the region of impact, the impact pad having a wavy upper surface defined by curved protrusions which are continuous and which are configured such that substantially the entire upper surface is curved provided by the protrusions in the region of the impact.

By reducing the horizontal flat areas in the floor of the tundish and, in particular, in that portion of the floor which experiences the greatest impact from the pouring of molten steel, the amount of vertical splashing can be significantly reduced. In accordance with the invention, this is accomplished by providing an impact pad having a wavy surface, in the region of impact. The waves are configured so as to cause significant portions of the impact surface to be slanted from the horizontal. This can be accomplished using triangular, sinusoidal, or certain other wave patterns.

The foregoing objects and embodiments are more clearly illustrated in the following detailed description made with reference to the accompanying figures in which:

FIGURE 1 is a side cross-sectional view of a tundish impact pad of the invention, located on the floor of a tundish vessel in the region of impact.

FIGURE 2 is a top plan view of the tundish impact pad and tundish vessel of FIGURE 1.

FIGURE 3 is an exploded side cross-sectional view of a tundish impact pad of the invention which illustrates the direction of impact and directions of splashing using arrows.

FIGURE 4(a) is a front cross-sectional view of one embodiment of the tundish impact pad shown in FIGURE 3. In this embodiment, the sinusoidal waves exist in the "x" direction and not in the "z" direction.

FIGURE 4(b) is a front cross-sectional view of a second embodiment of the tundish impact pad shown in FIGURE 3. In this embodiment, the sinusoidal waves exist in both the "x" and "z" directions.

FIGURE 5(a) is a perspective view of the embodiment of the tundish impact pad shown in FIGURES 3 and 4(a), having sinusoidal waves in the "x" direction but not in the "Z" direction.

FIGURE 5(b) is a perspective view of the embodiment of the tundish impact pad shown in FIGURES 3 and 4(b), having sinusoidal waves in both the "x" and

"z" directions.

FIGURE 6 is a side cross-sectional view of a third embodiment of the tundish impact pad of the invention, in which the waves are irregular.

FIGURE 7 is a side cross-sectional view of a fourth embodiment of a tundish impact pad of the invention, in which the waves are triangular.

FIGURE 8 is a side cross-sectional view of a tundish impact pad of the invention, used in conjunction with weirs to further reduce and contain the turbulence.

FIGURE 9 is a front cross-sectional view of a tundish impact pad arrangement designed to cover the floor and sidewalls of a tundish vessel.

FIGURE 10 is a perspective cross-sectional view of a tundish vessel in which tundish impact pads of the invention have been integrated into both the floor and the sidewalls of the tundish vessel.

Referring first to Figures 1 and 2, a tundish impact pad 10 of the invention is positioned on the floor 102 of a tundish vessel 100 in the region of impact 160. The tundish impact pad 10 comprises a wavy upper surface 12, located in the path of flow of the molten steel 150 entering the tundish vessel 100 from a ladle (not shown). The tundish impact pad also has a substantially flat, substantially rectangular lower surface 14 for supporting the impact pad 10, and four side surfaces 16, 18, 20 and 22 extending between the wavy upper surface 12 and the support surface 14.

The tundish impact pad 10 is constructed from a high temperature-resistant refractory composition which is capable of withstanding continuous exposure to molten iron or steel at temperatures of up to 3000 degrees Fahrenheit. Preferably, the impact pad is constructed from a refractory material containing about 60-85 per cent by weight Al_2O_3, 38-13 per cent by weight SiO_2, .9-.5 per cent by weight CaO, and 1-.5 per cent by weight Fe_2O_3. Other suitable refractory materials include MgO, SiC, Cr_2O_3, and ZrO_2. The composition of the impact pad is not limited to the named materials. Any refractory material can be used, so long as the impact pad will be capable of withstanding continuous, long-term exposure to molten iron or steel.

The tundish vessel is also constructed from a suitable refractory composition and includes four side walls 104, 106, 108 and 110, surrounding and extending upward from the floor 102. The floor 102 has a depressed portion 103, located at an end of the vessel opposite the region of impact 160 for the entering molten steel 150. A drain 120 is located in the depressed portion 103. Molten steel passes through the drain 120 and to the next processing location, usually a mold (not shown).

The molten steel within the tundish vessel 100 includes a substantially pure phase 152 located near the bottom of the vessel 100, and a slag layer 154 located near the top which contains a much higher concentration of impurities. The entering molten steel 150 causes some disruption of the slag layer 152, forcing some of the slag material toward the bottom of the vessel. Therefore, the tundish vessel 100 must be designed such that there is sufficient residence time in the vessel to allow impurities in the molten steel to float to the top of the steel, between the time the molten steel enters at the impact region 160 and the time it exits through the drain 120 in the depressed portion 103. The amount of molten steel in the tundish vessel 100 must also be maintained at a sufficient level to allow adequate separation between the slag material 154 and the substantially pure phase 152 existing near the bottom of the vessel.

The tundish impact pad 10 of the invention forms part of the overall design of the tundish vessel 100 and results in a much improved design for the vessel by reducing the splashing and turbulence caused by the pouring of molten steel 150 into the vessel. Figure 3 illustrates how the impact pad 10 causes substantial reduction in vertical splashing. The vectors A represent the downward forces caused by the pouring of molten steel 150 into the vessel 100. The vectors S represent the splashing forces created when the molten steel 150 comes into contact with the impact pad 10.

If the upper surface 12 of the impact pad 10 were completely flat and horizontal, or if the tundish vessel did not contain an impact pad 10, then the splashing forces S would be substantially vertical at all points. These vertical forces S would directly oppose the downward forces A caused by the pouring of molten steel, resulting in the highest possible agitation and turbulence inside the tundish vessel 100. This agitation and turbulence would significantly disturb the slag layer 154 and would make it difficult for impurities in the vessel to rise to the surface of the molten steel. This problem was faced in the iron and steel industry prior to the invention of the tundish impact pad described herein.

Through use of the tundish impact pad 10 shown in Figure 3, the substantially vertical splashing forces can be eliminated at all points in the region of impact except at the uppermost points 11 and the lowermost points 13 of the wavy surface 12. At all points in between, the splashing forces S are slanted to the left or right as shown in Figure 3, and do not significantly oppose the downward forces A of the entering molten steel 150. The result is that overall vertical splashing, agitation and turbulence are significantly reduced. This in turn results in less disruption of the slag layer 154 and greater purification of the lowermost portion 152 of the molten steel in the vessel.

In the embodiment shown in Figure 3, the upper surface 12 of the impact pad 10 varies in a sinusoidal fashion according to the equation:

$$y = a + b \sin (cx - d),$$

where

y is the height of the surface 12,

x is the horizontal distance along the surface 12 of the impact pad 10, from back to front, and

a, b, c and d are constants which affect the height of the waves, the length of the waves, and the configuration of the waves near the edges of the impact pad 10.

Figures 3, 4(a) and 5(a) define a first embodiment in which the height of the upper surface 12 is varied only in a single direction. Thus, the sine waves in the upper surface 12 appear only along the x-axis. As shown in Fig. 4(a), the upper surface 12 appears horizontal and flat in the "z" direction.

In order to cause even further reduction in vertical splashing, the horizontal areas of the wavy surface 12 can be further reduced by varying the height of the surface 12 in more than one direction. In the second embodiment defined by Figures 3, 4(b) and 5(b), the sine waves in the surface 12 appear along both the x-axis and the z-axis. In this second embodiment of the tundish impact pad 10 of the invention, the wavy upper surface 12 can be described according to the equations:

$$y = a + b\,(cx - d), \text{ and}$$
$$y = p + q \sin (rz - s),$$

where

y is the height of the surface 12,

x is the horizontal distance along the surface 12 of the impact pad, from back to front,

z is the horizontal distance along the surface 12 of the impact pad, from side to side,

a, b, c and d are constants which determine the height, length and configuration of the waves in the x direction, and

p, q, r and s are constants which determine the height, length and configuration of the waves in the z direction.

Various other wave configurations for the upper surface 12 of the impact pad 10 of the invention can also be employed. In Figure 6, a third embodiment is shown in which the wavy surface 12 varies irregularly, with the wavy surface being lower near the center of the impact pad 10 than near the sides 16 and 18. This embodiment of the invention helps contain the splashing and turbulence horizontally as well as reducing the vertical splashing of molten steel entering the tundish vessel.

Figure 7 illustrates the use of triangular waves instead of sine waves in the upper surface 12 of the impact pad 10 of the invention. Other wave configurations not shown can also be employed, provided that the wavy surface 12 is configured so as to significantly reduce the flat horizontal surface area in the impact region 160 of the tundish vessel. Square waves, for example, do not constitute an embodiment of the invention because an impact pad having square waves on its upper surface would have just as much horizontal surface area as an impact pad whose upper surface is completely flat.

The impact pad 10 of the invention may be used in conjunction with prior art methods and devices to cause even further reduction in splashing, agitation and turbulence inside the tundish vessel. In Figure 8, for example, the tundish impact pad 10 is located between two weirs 130 and 132 which help contain the splashing and turbulence to the impact region 160 inside the tundish vessel 100. In this case, the tundish vessel 100 has depressed regions 103 and 105 located at both ends of the floor 102 of the tundish vessel 100. Both depressed regions have drains 120 and 122, respectively.

The impact region 160 for the entering molten steel is located centrally between the depressed regions 103 and 105 in Figure 8. As molten steel enters the tundish vessel 100, the impact pad 10 significantly reduces vertical splashing, agitation and turbulence. The weirs 130 and 132 help contain any splashing, agitation or turbulence which nevertheless occurs, within the impact region 160 of the vessel 100.

In a highly preferred embodiment of the invention, tundish impact pads may be designed for covering both the floor and sidewalls in the impact region of a tundish vessel. Figure 9 illustrates an arrangement of three impact pads 10, 30 and 50 designed and arranged to cover the floor and sides of a tundish. The impact pad 10 has an upper wavy surface 12 for reducing vertical splashing, and a lower surface 14 for support. The impact pad 10 also has two slanted side surfaces 16 and 18 which are designed and arranged to interface with the slanted side surfaces 38 and 56 on the adjacent impact pads 30 and 50, respectively. The impact pad 10 is designed to cover the floor of a tundish vessel, at least in the region of impact.

The impact pads 30 and 50 are each designed to cover one side of the tundish vessel. Each impact pad has a wavy surface (32, 52) which significantly reduces any splashing, agitation or turbulence that may result from molten steel being directed against the sidewalls of the tundish vessel. Each impact pad also has a support surface (34, 54) for supporting the impact pads (30, 50) against the respective sidewalls of the tundish vessel, and edges (36, 38, 56 and 58) which extend between the wavy surfaces (32, 52) and the support surfaces (34, 54).

The tundish impact pad of the invention may exist as a separate device for placing inside a tundish vessel or may, alternatively, be integrated into the structure of the tundish vessel. Figure 10 illustrates an embodiment in which tundish impact pads 210, 230, 250 and 270 are integrated into the floor and sidewalls of the tundish vessel 200. The impact pads have wavy surfaces 212, 232, 252 and 272 which in this case define the floor and sidewalls of the tundish vessel.

Claims

1. A tundish vessel used in the iron and steel industry having a horizontal floor (102), a region of impact (16) on the floor and a drain (120) spaced from the region of impact; characterised in that an impact pad (10) formed from a high temperature-resistant refractory composition capable of withstanding continuous exposure to molten steel is, located on the floor (102) of the tundish vessel (100) at the region of impact (160), the impact pad (10) having a wary upper surface (12) defined by curved protrusions which are continuous and which are configured such that substantially the entire upper surface (12) is curved provided by the protrusions in the region of the impact (16).

2. A tundish vessel as claimed in Claim 1, characterised in that the upper surface (12) of the impact pad (10) includes curved protrusions which project upwardly and curved protrusions which project downwardly.

3. A tundish vessel as claimed in Claim 2, characterised in that the curved protrusions which project upwardly alternate with the curved protrusions which project downwardly such that the upper surface (12) of the impact pad (10) has a sinusoidal configuration.

4. A tundish vessel as claimed in any of Claims 1 to 3, characterised in that the upper surface (12) of the impact pad (10) has a height, z, which varies in one direction, x, such that the curved protrusions are parallel to each other.

5. A tundish vessel as claimed in any of Claims 1 to 3, characterised in that the upper surface (12) of the impact pad (10) has a height, z, which varies in two directions, x and y.

6. A tundish vessel as claimed in any of Claims 1 to 3, characterised in that the curved protrusions of the upper surface (12) of the impact pad (10) are configured in a rectilinear fashion.

7. A tundish vessel as claimed in any of claims 1 to 6, characterised in that the impact pad (10) further comprises a substantially flat, substantially rectangular lower surface (14) for supporting the impact pad (10) and four side surfaces (16,18,20,22) extending between the upper surface (12) and lower surface (14).

8. A tundish vessel as claimed in any of Claims 1 to 6, characterised in that the impact pad (10) forms part of the integral structure of the floor (102) of the tundish vessel (100).

9. A tundish vessel as claimed in any of Claims 1 to 8, characterised in that the vessel has a back wall (108), a front wall (110) and two side walls (104, 106).

10. A tundish vessel as claimed in Claim 9, characterised in that one or more additional impact pads (30,50) are located on the side walls (104,106) of the tundish vessel (100).

11. A tundish vessel as claimed in Claim 10, characterised in that said additional impact pad or pads (30,50) form part of the integral structure of the side walls (104,106) of the tundish vessel (100).

12. A tundish vessel as claimed in Claim 10 or Claim 11, further comprising an additional impact pad (272) located on the back wall (108) of the tundish vessel (110).

13. A tundish vessel as claimed in Claim 12, characterised in that said additional impact pad (272) on the back wall of the tundish vessel (100) forms part of the integral structure of the back wall (108).

14. A tundish vessel as claimed in any of the preceding claims, characterised in that said high temperature-resistant refractory composition comprises between about 60-85 weight percent Al_2O_3, between about 38-13 weight percent SiO_2, between about 0.9-0.5 weight percent CaO, and between about 1.0-0.5 weight percent Fe_2O_3.

15. A tundish vessel as claimed in any of the preceding claims, further comprising a weir (130) adjacent to the impact region (16) for confining splashing and turbulence to the impact region (160).

16. A tundish vessel as claimed in Claim 15, further comprising a second weir (32) adjacent to the impact region (160), the impact pad (10) being positioned between the two weirs (130, 132).

17. A tundish vessel as claimed in Claim 16, further comprising a second drain (122) located in the floor (102) of the tundish vessel (100), the impact region (160) being located between the two drains (120,122), the impact pad (10) and weirs (130,132) being arranged such that the weirs (130,132) stand between the impact pad (10) and the two drains (120,122).

Patentansprüche

1. Zwischengießgefäß, das in der Eisen- und Stahlindustrie eingesetzt wird, mit einem horizontalen Boden (102), einem Aufprallbereich (160) am Boden und einem Abfluß (120), der von dem Aufprallbereich beabstandet ist;
dadurch **gekennzeichnet**, daß
eine Aufpralleinlage (10), die aus einer hochtemperaturbeständigen, feuerfesten Zusammensetzung besteht, die gegenüber dem ständigen Kontakt mit geschmolzenem Stahl beständig ist, am Boden (102) des Zwischengießgefäßes (100) im Aufprallbereich (160) angeordnet ist, wobei die Aufpralleinlage (10) eine wellige obere Fläche (12) hat, die durch gewölbte Vorsprünge gebildet wird, die fortlaufend sind und die so angeordnet sind, daß im wesentlichen die gesamte obere Fläche (12) durch die Vorsprünge im Aufprallbereich (160) gewölbt ist.

2. Zwischengießgefäß nach Anspruch 1, dadurch gekennzeichnet, daß die obere Fläche (12) der Aufpralleinlage (10) gewölbte Vorsprünge enthält, die nach oben vorstehen, sowie gewölbte Vorsprünge, die nach unten vorstehen.

3. Zwischengießgefäß nach Anspruch 2, dadurch gekennzeichnet, daß sich die gewölbten Vorsprünge, die nach oben vorstehen, mit den gewölbten Vorsprüngen, die nach unten vorstehen, abwechseln, so daß die obere Fläche (12) der Aufpralleinlage (10) eine sinusartige Form hat.

4. Zwischengießgefäß nach einem der Ansprüche 1 bis 3, dadurch gekennzeichnet, daß die obere Fläche (12) der Aufpralleinlage (10) eine Höhe z hat, die sich in einer Richtung x ändert, so daß die gewölbten Vorsprünge parallel zueinander sind.

5. Zwischengießgefäß nach einem der Ansprüche 1 bis 3, dadurch gekennzeichnet, daß die obere Fläche (12) der Aufpralleinlage (10) eine Höhe z hat, die sich in zwei Richtungen x und y ändert.

6. Zwischengießgefäß nach einem der Ansprüche 1 bis 3, dadurch gekennzeichnet, daß die gewölbten Vorsprünge der oberen Fläche (12) der Aufpralleinlage (10) geradlinig angeordnet sind.

7. Zwischengießgefäß nach einem der Ansprüche 1 bis 6, dadurch gekennzeichnet, daß die Aufpralleinlage (10) des weiteren eine im wesentlichen flache, im wesentlichen rechteckige untere Fläche (14) umfaßt, die die Aufpralleinlage (10) trägt, sowie vier Seitenflächen (16,18,20,22), die sich zwischen der oberen Fläche (12) und der unteren Fläche (14) erstrecken.

8. Zwischengießgefäß nach einem der Ansprüche 1 bis 6, dadurch gekennzeichnet, daß die Aufpralleinlage (10) einen Teil der zusammenhängenden Struktur des Bodens (102) des Zwischengießgefäßes (100) bildet.

9. Zwischengießgefäß nach einem der Ansprüche 1 bis 8, dadurch gekennzeichnet, daß das Gefäß eine Rückwand (108), eine Vorderwand (110) und zwei Seitenwände (104,106) hat.

10. Zwischengießgefäß nach Anspruch 9, dadurch gekennzeichnet, daß eine oder mehrere zusätzliche Aufpralleinlagen (30,50) an den Seitenwänden (104,106) des Zwischengießgefäßes (100) angeordnet sind.

11. Zwischengießgefäß nach Anspruch 10, dadurch gekennzeichnet, daß die zusätzliche Aufpralleinlage oder -einlagen (30,50) einen Teil der zusammenhängenden Struktur der Seitenwände (104,106) des Zwischengießgefäßes (100) bilden.

12. Zwischengießgefäß nach Anspruch 10 oder Anspruch 11, das des weiteren eine zusätzliche Aufpralleinlage (272) umfaßt, die an der Rückwand (108) des Zwischengießgefäßes (100) angeordnet ist.

13. Zwischengießgefäß nach Anspruch 12, dadurch gekennzeichnet, daßdie zusätzliche Aufpralleinlage (272) an der Rückwand des Zwischengießgefäßes (100) einen Teil der zusammenhängenden Struktur der Rückwand (108) bildet.

14. Zwischengießgefäß nach einem der vorangehenden Ansprüche, dadurch gekennzeichnet, daß die hochtemperaturbeständige, feuerfeste Zusammensetzung ungefähr 60-85 Masseprozent Al_2O_3, ungefähr 38-13 Masseprozent SiO_2, ungefähr 0,9-0,5 Masseprozent CaO und ungefähr 1,0-0,5 Masseprozent Fe_2O_3 umfaßt.

15. Zwischengießgefäß nach einem der vorangehenden Ansprüche, das des weiteren einen Überlauf (130) an den Aufprallbereich (160) angrenzend umfaßt, der Spritzen und Turbulenz auf den Aufprallbereich (160) beschränkt.

16. Zwischengießgefäß nach Anspruch 15, das des weiteren einen zweiten Überlauf (32) an den Aufprallbereich (160) angrenzend umfaßt, wobei sich die Aufpralleinlage (10) zwischen den beiden Überläufen (130,132) befindet.

17. Zwischengießgefäß nach Anspruch 16, das des weiteren einen zweiten Ablauf (122) umfaßt, der

sich am Boden (102) des Zwischengießgefäßes (100) befindet, wobei der Aufprallbereich (160) zwischen den beiden Abläufen (120,122) angeordnet ist, wobei die Aufpralleinlage (10) und die Überläufe (130,132) so angeordnet sind, daß die Überläufe (130,132) zwischen der Aufpralleinlage (10) und den beiden Abläufen (120,122) stehen.

Revendications

1. Récipient de panier de coulée utilisé dans la sidérurgie, ayant un fond horizontal (102), une région (16) d'impact sur le fond et une évacuation (120) placée à distance de la région d'impact, caractérisé en ce qu'un patin d'impact (10) formé d'une composition réfractaire résistant à des températures élevées et capable de supporter une exposition continue à l'acier fondu est placé sur le fond (102) du récipient (100) de panier de coulée dans la région d'impact (160), le patin d'impact (10) ayant une surface supérieure ondulée (12) délimitée par des conformations courbes qui sont continues et qui ont une configuration telle que la totalité pratiquement de la surface supérieure (12) formée par les conformations dans la région d'impact (16) est courbe.

2. Récipient de panier de coulée selon la revendication 1, caractérisé en ce que la surface supérieure (12) du patin d'impact (10) a des conformations courbes qui dépassent vers le haut et des conformations courbes qui dépassent vers le bas.

3. Récipient de panier de coulée selon la revendication 2, caractérisé en ce que les conformations courbes qui dépassent vers le haut alternent avec des conformations courbes qui dépassent vers le bas si bien que la surface supérieure (12) du patin d'impact (10) a une configuration sinusoïdale.

4. Récipient de panier de coulée selon l'une quelconque des revendications 1 à 3, caractérisé en ce que la surface supérieure (12) du patin d'impact (10) a une hauteur z qui varie dans une direction x de manière que les conformations courbes soient parallèles les unes aux autres.

5. Récipient de panier de coulée selon l'une des revendications 1 à 3, caractérisé en ce que la surface supérieure (12) du patin d'impact (10) a une hauteur z qui varie dans deux directions x et y.

6. Récipient de panier de coulée selon l'une des revendications 1 à 3, caractérisé en ce que les conformations courbes de la surface supérieure (12) du patin d'impact (10) ont une configuration rectiligne.

7. Récipient de panier de coulée selon l'une des revendications 1 à 6, caractérisé en ce que le patin d'impact (10) comporte en outre une surface inférieure sensiblement plate et sensiblement rectangulaire (14) destinée à supporter le patin d'impact (10) et quatre faces latérales (16, 18, 20, 22) disposées entre la surface supérieure (12) et la surface inférieure (14).

8. Récipient de panier de coulée selon l'une des revendications 1 à 6, caractérisé en ce que le patin d'impact (10) fait partie de la structure en une seule pièce du fond (102) du récipient (100) de panier de coulée.

9. Récipient de panier de coulée selon l'une des revendications 1 à 8, caractérisé en ce que le récipient a une paroi arrière (108), une paroi avant (110) et deux parois latérales (104, 106).

10. Récipient de panier de coulée selon la revendication 9, caractérisé en ce qu'un ou plusieurs patins supplémentaires d'impact (30, 50) sont placés sur les parois latérales (104, 106) du récipient (100) de panier de coulée.

11. Récipient de panier de coulée selon la revendication 10, caractérisé en ce que le patin ou les patins supplémentaires d'impact (30, 50) font partie de la structure en une seule pièce des parois latérales (104, 106) du récipient (100) de panier de coulée.

12. Récipient de panier de coulée selon la revendication 10 ou 11, comprenant en outre un patin supplémentaire d'impact (272) placé sur la paroi arrière (108) du récipient (100) de panier de coulée.

13. Récipient de panier de coulée selon la revendication 12, caractérisé en ce que le patin supplémentaire d'impact (272) de la paroi arrière du récipient (100) de panier de coulée fait partie de la structure en une seule pièce de la paroi arrière (108).

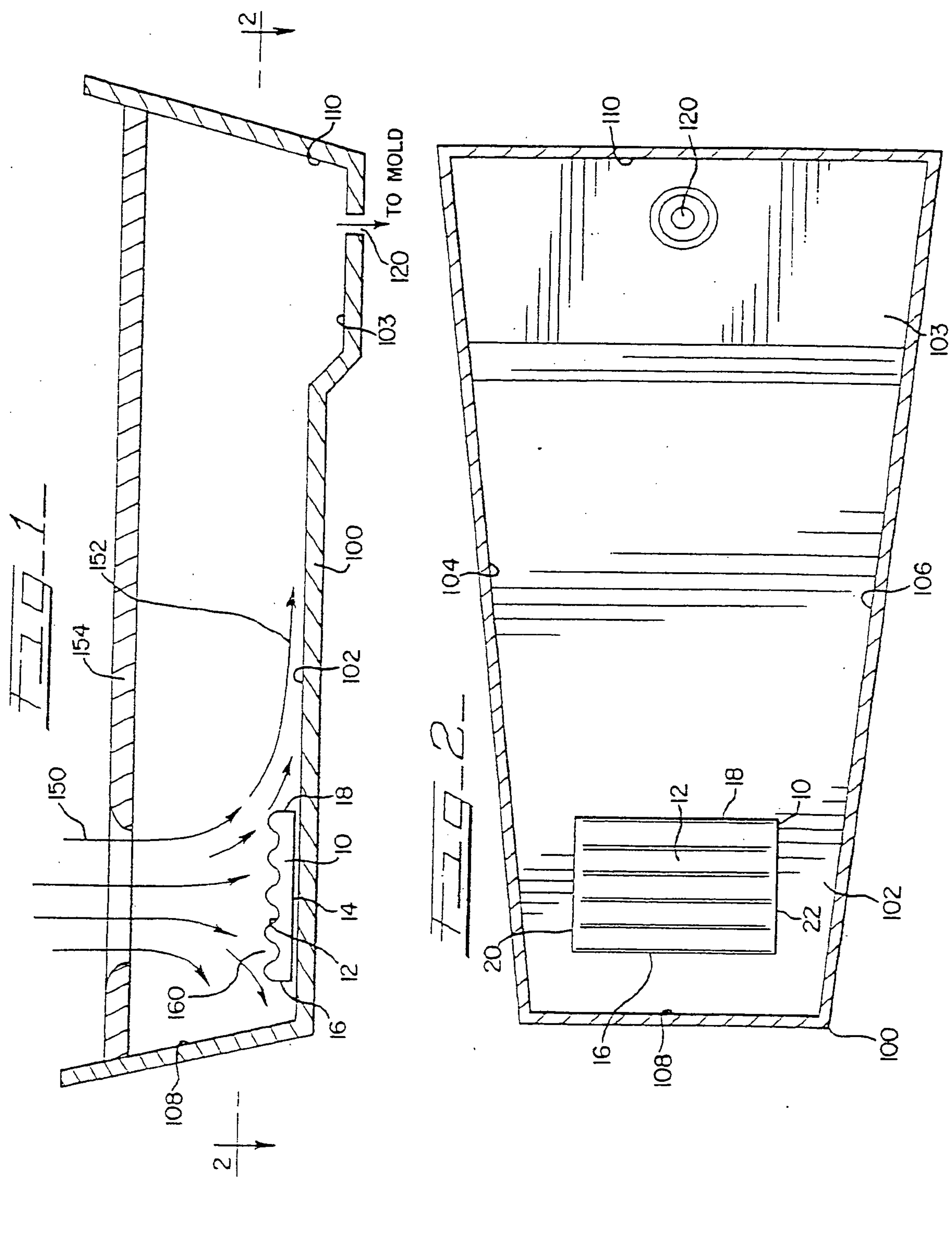
14. Récipient de panier de coulée selon l'une quelconque des revendications précédentes, caractérisé en ce que la composition réfractaire résistant aux températures élevées contient environ 60 à 85 % en poids de Al_2O_3, environ 38 à 13 % en poids de SiO_2, environ 0,9 à 0,5 % en poids de CaO, et environ 1,0 à 0,5 % en poids de Fe_2O_3.

15. Récipient de panier de coulée selon l'une quel-

conque des revendications précédentes, comprenant en outre un déversoir (130) adjacent à la région d'impact (16) et destiné à retenir les éclaboussures et la turbulence dans la région d'impact (160).

16. Récipient de panier de coulée selon la revendication 15, comprenant en outre un second déversoir (32) adjacent à la région d'impact (160), le patin d'impact (10) étant placé entre les deux déversoirs (130, 132).

17. Récipient de panier de coulée selon la revendication 16, comprenant en outre une seconde évacuation (122) placée au fond (102) du récipient (100) de panier de coulée, la région d'impact (160) étant placée entre les deux évacuations (120, 122), le patin d'impact (10) et les déversoirs (130, 132) étant disposés afin que les déversoirs (130, 132) soient placés entre le patin d'impact (10) et les deux évacuations (120, 122).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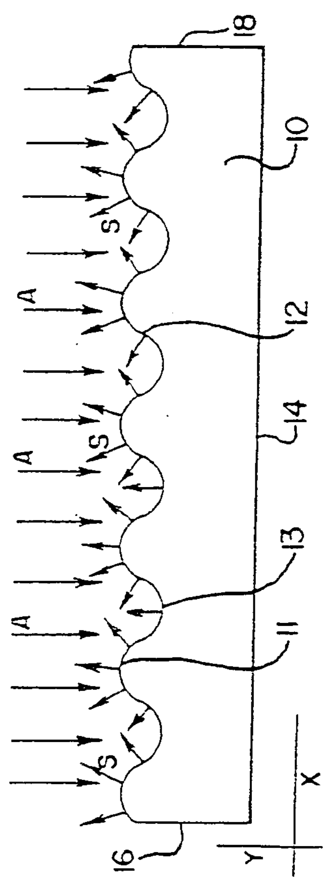

FIG. 3

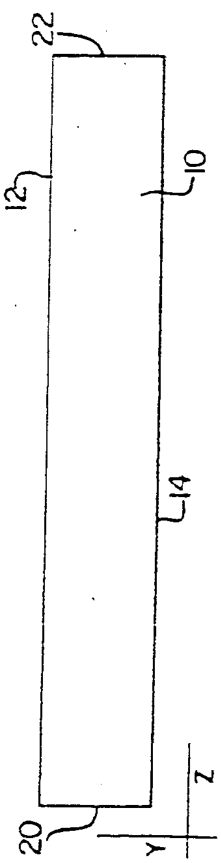

FIG. 4a

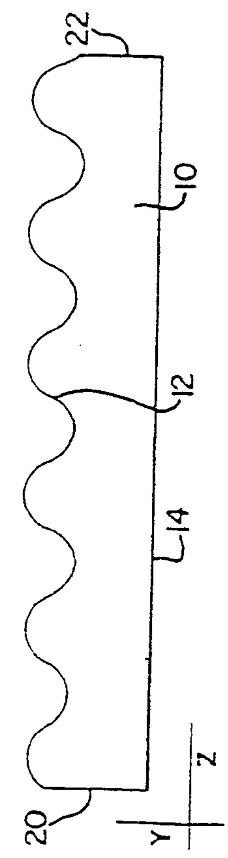

FIG. 4b

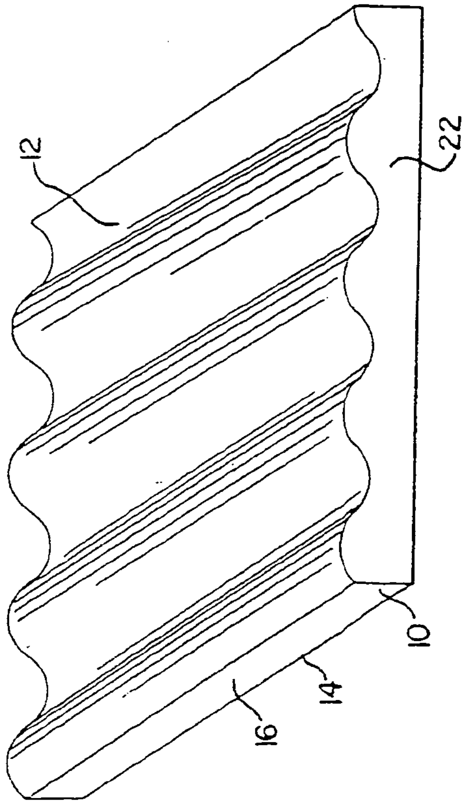

FIG. 5a

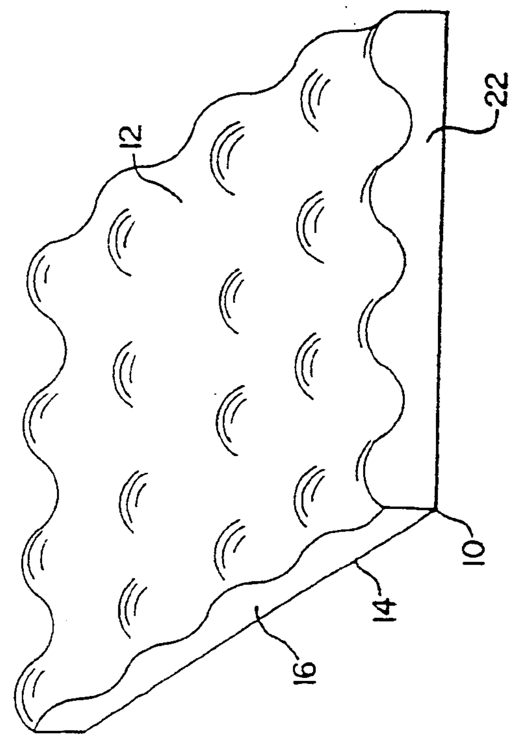

FIG. 5b

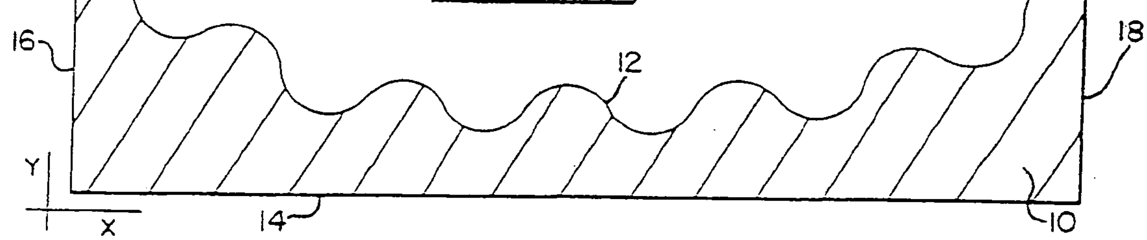

Fig_6_

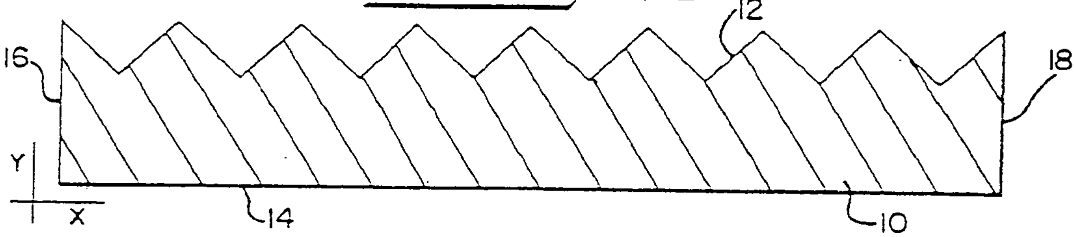

Fig_7_

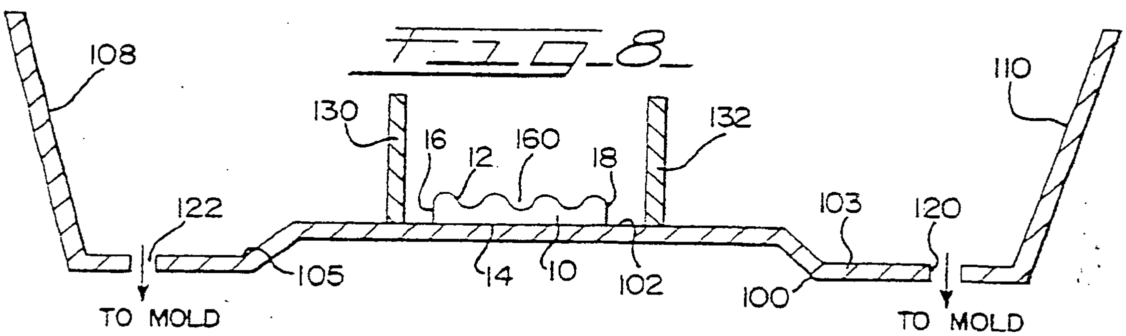

Fig_8_

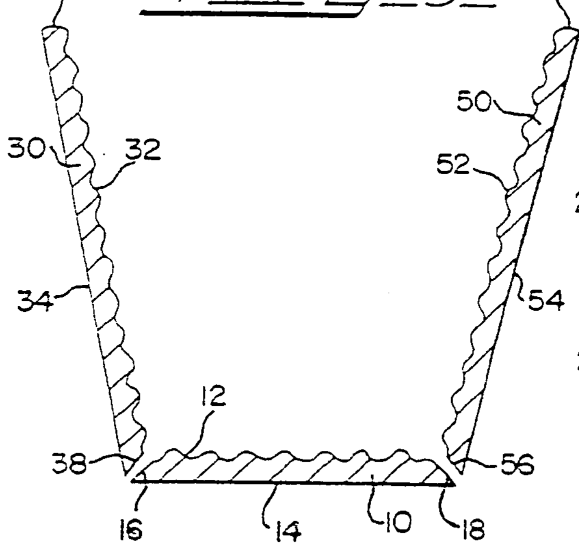

Fig_9_

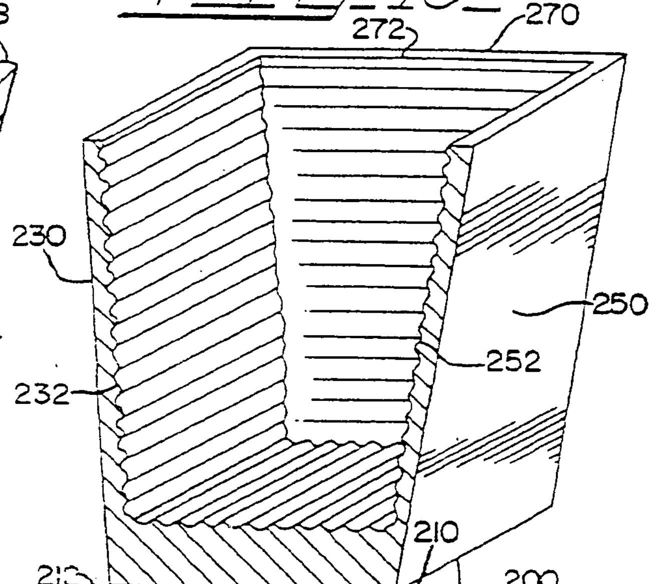

Fig_10_